Complete Summary

GUIDELINE TITLE

Pediatric eye evaluations.

BIBLIOGRAPHIC SOURCE(S)

American Academy of Ophthalmology Pediatric Ophthalmology Panel. Pediatric eye evaluations. San Francisco (CA): American Academy of Ophthalmology; 2002 Oct. 22 p. [36 references]

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Eye abnormalities in children, including, but not limited to:

- Amblyopia
- Childhood retinal dystrophy/degeneration
- Coloboma (iris or retinal)
- Congenital cataract
- Congenital glaucoma
- Conjunctivitis
- Delayed visual maturation
- Diseases associated with a cloudy cornea
- Leukocoria
- Nasolacrimal duct obstruction
- Nystagmus
- Ptosis
- Refractive disorder
- Retinoblastoma
- Retinopathy of prematurity
- Strabismus

GUIDELINE CATEGORY

Evaluation
Screening

CLINICAL SPECIALTY

Family Practice
Ophthalmology
Pediatrics

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Health Plans
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

Section I (Pediatric Eye Screening): To identify children who may have eye or visual abnormalities or risk factors for developing eye problems and refer them for a comprehensive pediatric medical eye evaluation and to address the following goals:

- To extend eye and vision screening to all children.
- To identify and record the following:
    - Risk factors for eye and visual abnormalities.
    - Level of vision in each eye individually.
    - Ocular alignment abnormalities.
    - Ocular structural abnormalities.
- To explain results and limitations of screening tests to parent/caregiver and initiate an appropriate follow-up plan (referral).

Section II (Comprehensive Medical Eye Evaluation): To evaluate abnormalities detected on screening, to identify risk factors for and to detect and diagnose sight- and health-threatening disease, and to initiate a plan of treatment as necessary and to address the following goals:

- Identify risk factors for ocular disease.
- Identify risk factors for systemic disease based on ocular findings.
- Identify factors that may predispose to visual loss early in a child's life.
- Determine the health status of the eye, visual system and related structures, and assess refractive errors.
- Discuss the nature of the findings of the examination and their implications with the parent/caregiver, primary care physician (with report) and, when appropriate, the patient.
- Plan and initiate an appropriate response (e.g., treatment, counseling, further diagnostic tests, referral, follow-up, early intervention services).

TARGET POPULATION

Newborns and children to age 18

INTERVENTIONS AND PRACTICES CONSIDERED

Pediatric Eye Screening

1. History
2. Screening examination
    - Red reflex
    - External inspection
    - Visual acuity
    - Corneal light reflex (Hirschberg) test
    - Cover testing for ocular alignment and motility
    - Binocular red reflex (Bruckner) test
    - Stereovision testing
    - Photoscreening
3. Referral, if necessary

Comprehensive Pediatric Medical Eye Evaluation

1. History
2. Examination
    - Assessment of visual acuity
    - Pupillary examination
    - Ocular alignment and motility
    - External examination
    - Anterior segment examination
    - Cycloplegic retinoscopy/refraction
    - Funduscopic examination
3. Additional tests
    - Stereoacuity testing
    - Color-vision testing
    - Intraocular pressure management
    - Visual fields
4. Diagnosis and management
    - Re-evaluation
    - Referral to a geneticist, if indicated
    - Prescription of eyeglasses

MAJOR OUTCOMES CONSIDERED

- Visual acuity and binocular visual function
- Visual loss

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

In the process of updating and revising the original guideline, a detailed literature search of articles in the English language on the subject of pediatric eye evaluation for the years 1996 to 2001 was conducted.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Strength of Evidence Ratings

Level I: Includes evidence obtained from at least one properly conducted, well-designed randomized controlled trial. It could include meta-analyses of randomized controlled trials.

Level II: Includes evidence obtained from the following:

- Well-designed controlled trials without randomization
- Well-designed cohort or case-control analytic studies, preferably from more than one center
- Multiple-time series with or without the intervention

Level III: Includes evidence obtained from one of the following:

- Descriptive studies
- Case reports
- Reports of expert committees/organization
- Expert opinion (e.g., preferred practice patterns panel consensus)

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

The results of the literature search were reviewed by the Pediatric Ophthalmology Panel and used to prepare the recommendations, which they rated in two ways.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

The results of a literature search on the subject of pediatric eye evaluation were reviewed by the Pediatric Ophthalmology Panel and used to prepare the recommendations, which they rated in two ways. The panel first rated each recommendation according to its importance to the care process. This "importance to the care process" rating represents care that the panel thought would improve the quality of the patient´s care in a meaningful way. The panel also rated each recommendation on the strength of the evidence in the available literature to support the recommendation made.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Ratings of importance to care process

Level A, most important
Level B, moderately important
Level C, relevant, but not critical

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

These guidelines were reviewed by Council and approved by the Board of Trustees of the American Academy of Ophthalmology (September 2002). All Preferred Practice Patterns are reviewed by their parent panel annually or earlier if developments warrant and updated accordingly.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Specific recommendations are followed by a rating that indicates the level of importance to the care process (A-C) and a strength of evidence rating (I-III), both of which are defined at the end of the "Major Recommendations" field.

Pediatric Eye Screening

Age-appropriate eye and vision evaluations should be performed in the newborn period and at all subsequent health supervision visits, [A:III] since different childhood eye problems may be detected at each (see Table 1 below).

History

At a child´s first examination with a new primary care provider, a history of risk factors for eye and vision abnormalities should be elicited. [A:III] Infants at risk for eye problems because of family history of congenital cataract, congenital glaucoma, retinoblastoma, metabolic or genetic disease should be referred for a comprehensive pediatric medical eye evaluation as early as possible. [A:III]

Screening Examination

The screening eye examination should include examination of the red reflex to detect abnormalities of the ocular media; external inspection to detect ocular abnormalities; visual acuity on an age-appropriate basis; and, after 6 months of age, the corneal light reflex (Hirschberg) test and cover testing both for ocular alignment and motility testing. [A:III]

If a structural eye problem is detected, the baby should be referred on an urgent basis. [A:III]

At 6 months of age all infants should be evaluated for fixation preference, ocular alignment, and the health of ocular structures. [A:III]

Vision testing should be performed for a child at the earliest age that is practical, and it is recommended for all children starting at age 3. [A:III] The most sophisticated test that a child is capable of performing should be used to achieve the most accurate testing possible. [A:III] If a child is unable to cooperate with vision testing at 3 years of age, a second attempt should be made within 6 months. [A:III] If the child is not able to complete vision screening at that time, then (s)he should be referred for a comprehensive pediatric medical eye evaluation. [A:III]

Screening Sites and Automated Methods

Photoscreening and autorefractive devices may be helpful adjuncts but they should not replace standard screening techniques and evaluation criteria (see Table 1 below). [A:III]

Referral Plan

If eye and vision abnormalities or their risk factors are suspected or identified at a screening examination, an appropriate referral plan should be initiated and recorded. [A:III] Table 2 below lists specific examples of indications for a referral for a comprehensive pediatric medical eye evaluation.

Provider

The physicians, nurses, and other providers who perform eye and vision screening should be educated and trained in eliciting a history of risk factors for eye and visual abnormalities, detecting structural eye problems, and assessing visual abilities or acuities at every age. [A:III] Screeners should be trained and

cognizant of the difficulties involved in the testing of infants, toddlers, and older children. [A:III]

Comprehensive Pediatric Medical Eye Evaluation

History

- Demographic data. [A:III]
- Documentation of identity of historian. [B:III]
- The identity of other pertinent health care providers. [A:III]
- The chief complaint and reason for the eye evaluation. [A:III]
- Current eye problems. [A:III]
- Ocular history. [A:III]
- Systemic history; birth weight; prenatal, perinatal, and postnatal medical factors that may be pertinent; past hospitalizations and operations; and general health and development. [A:III]
- Review of systems. [B:III]
- Family and social history, eye conditions, and relevant systemic diseases. [A:III]
- Current medications and allergies. [A:III]

Examination

- Assessment of visual acuity. [A:III]
- Pupillary examination. [A:III]
- Ocular alignment and motility. [A:III]
- External examination. [A:III]
- Anterior segment examination. [A:III]
- Cycloplegic retinoscopy/refraction. [A:III]
- Funduscopic examination. [A:III]

Additional Tests

Intraocular pressure should be measured whenever risk factors or ocular signs and symptoms of glaucoma exist. [A:III] Quantitative visual field testing in younger children may be difficult to perform and reliability should be carefully assessed. [A:III]

Diagnosis and Management

The ophthalmologist should discuss the importance of the findings and the need for further evaluation, testing, or treatment with the patient´s parent/caregiver. [A:III] When a hereditary eye disease is identified, the parent/caregiver should be advised to have other family members evaluated, which may include referral to a geneticist. [A:III]

Re-evaluations are indicated when new symptoms occur, new risk factors for eye disease or vision problems are identified, and for the periodic management of chronic eye or vision conditions. [A:III] Evaluation results fall into three general categories: low risk, high risk, and requiring intervention.

Category I: Low Risk

Although this group of patients is considered low risk, periodic eye screening by the primary care provider should be continued (see Table 1 below). [A:III] Patients should undergo a comprehensive pediatric medical eye evaluation if new ocular symptoms, signs, or risk factors for ocular disease develop. [A:III]

Category II: High Risk

The ophthalmologist should determine an appropriate follow-up interval for each patient based on the findings. [A:III]

Category III: Requiring Intervention

Optical correction should be considered if the visual acuity can be improved or the patient has asthenopia. [A:III] Table 3 below gives guidelines for prescribing eyeglasses in children under age 4.

Table 1. Recommended Ages and Methods for Pediatric Eye Evaluation Screening

Recommended Age

Newborn to 3 months

Method: Red reflex
Indications for referral to an ophthalmologist: Abnormal or asymmetric

Method: Inspection
Indications for referral to an ophthalmologist: Structural abnormality

3 to 6 months (approximately)

Method: Fix and follow
Indications for referral to an ophthalmologist: Failure to fix and follow in a cooperative infant

Method: Red reflex
Indications for referral to an ophthalmologist: Abnormal or asymmetric

Method: Inspection
Indications for referral to an ophthalmologist: Structural abnormality

6 to 12 months and until child is able to cooperate for verbal visual acuity

Method: Fix and follow with each eye
Indications for referral to an ophthalmologist: Failure to fix and follow

Method: Alternate occlusion
Indications for referral to an ophthalmologist: Failure to object equally to covering each eye

Method: Corneal light reflex
Indications for referral to an ophthalmologist: Asymmetric

Method: Red reflex
Indications for referral to an ophthalmologist: Abnormal or asymmetric

Method: Inspection
Indications for referral to an ophthalmologist: Structural abnormality

3 years (approximately)

Method: Visual acuity* (monocular)
Indications for referral to an ophthalmologist: 20/50 or worse, or 2 lines of difference between the eyes

Method: Corneal light reflex/cover-uncover
Indications for referral to an ophthalmologist: Asymmetric/ocular refixation movements

Method: Red reflex
Indications for referral to an ophthalmologist: Abnormal or asymmetric

Method: Inspection
Indications for referral to an ophthalmologist: Structural abnormality

5 years (approximately)

Method: Visual acuity* (monocular)
Indications for referral to an ophthalmologist: 20/40 or worse, or 2 lines of difference between the eyes

Method: Corneal light reflex/cover-uncover
Indications for referral to an ophthalmologist: Asymmetric/ocular refixation movements

Method: Red reflex
Indications for referral to an ophthalmologist: Abnormal or asymmetric

Method: Inspection
Indications for referral to an ophthalmologist: Structural abnormality

Every 1 to 2 years after age 5

Method: Visual acuity* (monocular)
Indications for referral to an ophthalmologist: 20/30 or worse, or 2 lines of difference between the eyes

Method: Corneal light reflex/cover-uncover
Indications for referral to an ophthalmologist: Asymmetric/ocular refixation movements

Method: Red reflex
Indications for referral to an ophthalmologist: Abnormal or asymmetric

Method: Inspection
Indications for referral to an ophthalmologist: Structural abnormality

Note: These recommendations are based on panel consensus. Although the child may be retested if screening is inconclusive or unsatisfactory, undue delays should be avoided; if inconclusive on retesting, referral for a comprehensive pediatric medical eye evaluation is indicated. [A:III]

Note: Use of medication for pupillary dilation facilitates evaluation of the red reflex. For infants, a combined weak solution of phenylephrine hydrochloride and cyclopentolate (cyclomydril [Alcon, Ft. Worth, TX]) is associated with fewer side effects.

*Figures, letters, "tumbling E" or optotypes, LEA symbols (Precision Vision, Inc., La Salle, IL), vision testing machines.

Table 2. Indications for a Comprehensive Pediatric Medical Eye Evaluation

Indication:

Abnormalities on the screening evaluations (see Table I)

Specific Examples:

Detection of a red reflex abnormality or asymmetry
Detection of a structural eye abnormality
Detection of an ocular alignment or motility abnormality
Unable to perform vision screening at age 3-3 1/2 or older
Visual acuity 20/50 or worse, or a 2 line difference in a 3-year-old
Visual acuity 20/40 or worse, or a 2 line difference in a 5-year-old
Visual acuity 20/30 or worse, or a 2 line difference in a 6-year-old or older child

Indication:

Signs or symptoms of eye problems by history or intuitive concerns of family members[#]

Specific Examples:

Defective ocular fixation or visual interactions
Abnormal light reflex (including both the corneal light reflections and the "red" fundus reflection)
Ocular alignment or movement abnormality
Nystagmus (shaking of eyes)
Persistent tearing
Persistent ocular discharge
Persistent redness
Persistent light sensitivity
Squinting
Eye closure
Head tilt
Learning disabilities

Indication:

Risk factors (general health problems, systemic disease, or use of medications that are known to be associated with eye disease and visual abnormalities)

Specific Examples:

Prematurity (see Appendix 2 of the original guideline document for screening guidelines)
Perinatal complications (evaluation at birth and at 6 months)
Neurological disorders or neurodevelopmental delay (upon diagnosis)
Juvenile rheumatoid arthritis (upon diagnosis)
Diabetes mellitus (5 years after onset, yearly thereafter) [A:I]
Systemic syndromes with ocular manifestations (at 6 months or upon diagnosis)
Chronic systemic steroid therapy or other medications (e.g., hydroxychloroquine) known to cause eye disease

Indication:

A family history of conditions that cause or are associated with eye or vision problems

Specific Examples:

Retinoblastoma
Childhood cataract
Childhood glaucoma

Retinal dystrophy/degeneration
Strabismus
Amblyopia
Glasses in early childhood
Sickle cell disease
Systemic syndromes with ocular manifestations

Note: These recommendations are based on panel consensus except where noted.

[#] "Headache" is not included since it is rarely caused by eye problems in children. This complaint should first be evaluated by the primary care physician.

Table 3. Guidelines for Prescribing Eyeglasses for Young Children

Condition: Isometropia (similar refractive error in both eyes)

Myopia

Age 0-1 year: ≥ –4.00 diopters
Age 1-2 years: ≥ –4.00 diopters
Age 2-3 years: ≥ –3.00 diopters

Hyperopia (no manifest deviation)*

Age 0-1 year: ≥ +6.00 diopters
Age 1-2 years: ≥ +5.00 diopters
Age 2-3 years: ≥ +4.50 diopters

Hyperopia with esotropia**

Age 0-1 year: > +2.00 diopters
Age 1-2 years: > +2.00 diopters
Age 2-3 years: > +1.50 diopters

Astigmatism***

Age 0-1 year: ≥ 3.00 diopters
Age 1-2 years: ≥ 2.50 diopters
Age 2-3 years: > 2.00 diopters

Condition: Anisometropia

Myopia

Age 0-1 year: ≥ - 2.50 diopters
Age 1-2 years: ≥ - 2.50 diopters
Age 2-3 years: ≥ - 2.00 diopters

Hyperopia

Age 0-1 year: ≥ +2.50 diopters
Age 1-2 years: ≥ +2.00 diopters
Age 2-3 years: ≥ +1.50 diopters

Astigmatism***

Age 0-1 year: ≥ 2.50 diopters
Age 1-2 years: ≥ 2.00 diopters
Age 2-3 years: ≥ 2.00 diopters

Note: These values were generated by consensus and are based solely on professional experience and clinical impressions, because there are no scientifically rigorous published data for guidance. The exact values are unknown and may differ among age groups; they are presented as general guidelines.

*May reduce the amount by up to +2.00 D, or if the cycloplegic prescription is ≥ +7.00 D may reduce by up to +3.00 D.

**Give the full cycloplegic prescription. If ≥ +3.00 D, may reduce by +0.50 D.

***Any oblique astigmatism (defined as ≥15 degrees from the 90-degree or 180-degree axis) > 1 D should be considered for treatment.

Definitions

Importance to the care process:

Level A: defined as most important

Level B: defined as moderately important

Level C: defined as relevant but not critical

Strength of evidence:

Level I: Includes evidence obtained from at least one properly conducted, well-designed randomized controlled trial. It could include meta-analyses of randomized controlled trials.

Level II: Includes evidence obtained from the following:

- Well-designed controlled trials without randomization
- Well-designed cohort or case-control analytic studies, preferably from more than one center
- Multiple-time series with or without the intervention

Level III: Includes evidence obtained from one of the following:

- Descriptive studies
- Case reports

- Reports of expert committees/organization
- Expert opinion (e.g., preferred practice patterns panel consensus)

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for selected recommendations (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- In general, the guidelines will improve awareness of the importance of early detection of childhood eye diseases among the public, health care providers, policy makers, and third-party payers.
- An understanding of the risk factors for amblyopia (i.e., genetic predisposition) will identify those children at higher risk and ultimately reduce the incidence of visual loss.
- The comprehensive pediatric medical eye evaluation can uncover abnormalities of a child's visual system and related structures (i.e., refractive errors, strabismus, cataracts, ptosis) that can lead to amblyopia and strabismus. If detected at any early age in childhood, amblyopia can be treated effectively and permanent visual loss can be avoided.
- A comprehensive medical eye evaluation may also uncover less common but potentially serious eye disorders such as ocular tumors (i.e., retinoblastoma), the treatment of which may be sight and life saving. The examination can also detect congenital eye abnormalities, which may be hereditary. It is important to detect hereditary eye diseases, because other family members may be at risk for the same disorder. Congenital eye abnormalities may indicate the presence of systemic disorders, affect general health, or impede normal development.

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- Preferred Practice Patterns provide guidance for the pattern of practice, not for the care of a particular individual. While they should generally meet the needs of most patients, they cannot possibly best meet the needs of all patients. Adherence to these Preferred Practice Patterns will not ensure a

successful outcome in every situation. These practice patterns should not be deemed inclusive of all proper methods of care or exclusive of other methods of care reasonably directed at obtaining the best results. It may be necessary to approach different patients´ needs in different ways. The physician must make the ultimate judgment about the propriety of the care of a particular patient in light of all of the circumstances presented by that patient. The American Academy of Ophthalmology is available to assist members in resolving ethical dilemmas that arise in the course of ophthalmic practice.

- Preferred Practice Patterns are not medical standards to be adhered to in all individual situations. The Academy specifically disclaims any and all liability for injury or other damages of any kind, from negligence or otherwise, for any and all claims that may arise out of the use of any recommendations or other information contained herein.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Living with Illness
Staying Healthy

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

American Academy of Ophthalmology Pediatric Ophthalmology Panel. Pediatric eye evaluations. San Francisco (CA): American Academy of Ophthalmology; 2002 Oct. 22 p. [36 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1992 Jun (revised 2002 Oct)

GUIDELINE DEVELOPER(S)

American Academy of Ophthalmology - Medical Specialty Society

SOURCE(S) OF FUNDING

American Academy of Ophthalmology

GUIDELINE COMMITTEE

Pediatric Ophthalmology Panel, Preferred Practice Patterns Committee

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

No proprietary interests were disclosed by members of the Preferred Practice Patterns Pediatric Ophthalmology Panel for the past 3 years up to and including June 2002 for product, investment, or consulting services regarding the equipment, process, or products presented or competing equipment, process, or products presented.

GUIDELINE STATUS

This is the current release of the guideline.

It updates a previous version: Pediatric eye evaluations. San Francisco (CA): American Academy of Ophthalmology (AAO); 1997. 17 p.

This document is valid for 5 years from the date released unless superseded by a revision. All Preferred Practice Patterns are reviewed by their parent panel annually or earlier if developments warrant.

GUIDELINE AVAILABILITY

Electronic copies: Available from the American Academy of Ophthalmology (AAO) Web site.

Print copies: Available from American Academy of Ophthalmology, P.O. Box 7424, San Francisco, CA 94120-7424; telephone, (415) 561-8540.

AVAILABILITY OF COMPANION DOCUMENTS

None available

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on June 30, 1998. The information was verified by the guideline developer on December 1, 1998. This summary was updated on March 12, 2003. The updated information was verified by the guideline developer on April 2, 2003.

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